International Journal of Finance and Managerial Accounting, Vol.9, No.35, Autumn 2024 IJFMA

Comparing the Informed and Noise Investors' Perception of the Tone of Financial Statements and Its Impact on Stock Returns: A Text-Mining Approach

Morteza Aram
Department of Accounting, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran
aramend1384@yahoo.com

Afsaneh Soroushyar
Department of Accounting, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran.
(Corresponding Author)
a_soroushyar@yahoo.com

Submit: 23/02/2022 **Accept:** 06/11/2022

ABSTRACT

Fluctuations in the companies' stock returns depend deeply on the nature of informed and noise traders' behavior and inclinations. In qualitative accounting reports, managers try to influence the investors' behavior and inclinations by choosing words with specific semantic orientations. The purpose of the present study is to compare the impact of informed and noise traders' perceptions on the company's stock returns; it also investigates, from the informed and noise traders' perspective, the effect of the board of directors' report tone on the stock market reaction. In this regard, qualitative data from the board of directors' reports, text mining approach, LASSO Regression have been used. In order to separate capital market traders into two groups of informed and noise ones, Kalman Filtering has been applied. All words employed in each report have been divided into three categories: words based on fact, words based on emotion, and words with a mixed meaning. The study thus compares the effect of informed and noise traders' perceptions of each type of word on stock returns. The statistical population of this study includes all companies listed on the Tehran Stock Exchange during the period 2012-2020; the statistical sample includes 116 firms selected through the systematic removal method. The research findings indicate that informed and noise traders can achieve abnormal returns by using fact-based and emotion-laden words, respectively, Also the tone of the board of directors' reports is an influential factor just for informed investors; it does not affect the noise traders' behavior and reaction.

Keywords: Informed Traders; Noise Traders; Text Mining; Abnormal Returns; The Tone of Financial Reports.

1. Introduction

Information is the most important factor in the effective functioning of security markets. Among all efficient market participants, information is considered as a communication tool and the most valuable element in the capital market that can play an effective role in the optimal allocation of capital (Freedman and satagliano, 2002). in this regard, accounting as a financial information and reporting system provides a variety of financial reports to capital market participants. The main purpose of this system is to provide useful information for investment and attestation decision-makers. This information is useful when it leads to changes in the investors' beliefs and actions, and also when one is able to measure the degree of the usefulness of information based on the rate of changes in prices and returns after its dissemination. Because investors seek to predict companies' stock returns by creating a bridge between stock returns and published information. In recent years, due to the development of capital market, the increasing complexity of markets and financial and economic events, and the growth of behavioral financial issues, accounting, in addition to structured, numerical and financial information, also provides non-numerical, non-financial and descriptive (qualitative) information without structure in order to meet the expectations of society and complete its information portfolio. Although companies' quantitative information and reports are important, they have received less attention for reasons such as retrospective reporting and investors' need to specialized skills to decode and process. Qualitative and textual accounting reports, such as board of directors' report and notes to the financial statements, are a supplement to the financial statements. While stating the methods and criteria, these reports provide a basis for interpreting the financial position, financial performance, and cash flows of the business unit. Presenting these reports along with financial statements improves the usefulness of the information provided and helps users make better decisions about finance for the business unit. This type of information nowadays accounts for a larger volume of corporate financial reports (Hajek et al., 2014). With the expansion of the amount of this information, the investors' attention and meditation on this type of information has also increased, and it has caused, in order to prepare and prepare these types of reports, managers use all kinds of semantic orientations in their opinion in order to influence the judgmental and cognitive behaviors of investors (Shleifer, 1961).

In accounting textual and qualitative reports, due to the lack of standards, rules and systematic structures related to the preparation and writing of such reports, the manager and the writer always have a lot of freedom and flexibility; they can thus shape the form and content of the report. An important feature of accounting textual and qualitative information is its tone. In accounting, tone is the difference between the number of positive and negative words and phrases in the text; these linguistic types can be employed by the reporter to change the implicit meaning of the text (Fisher et al., 2019). The tone of financial reporting is a double-edged sword that can be used both positively (providing information) and opportunistically. According to the agency theory, and considering the conflict of interests between company managers and investors, managers use it as a form of purposeful, intentional and conscious perception in order to manipulate and deviate perceptions and change those of the users' and investors' prospects about companies' future performance and returns (Boudt and Thewissen, 2019). However, the skills to process and access these reports and information are different for investors who may be easily misled by parasitic symptoms that have no deeper meaning (Hannemann et al., 2018). In financial markets, this is recognized by noise trader theory, which divides investors into two categories: informed traders whose investments are presumed to be based on rational decisions; and noise traders whose decisions to invest are based on emotions, illusions, rumors and blind imitation of others, which cannot be justified on rational grounds (Shleifer, 1961; Shiller et al.,1984). Noise traders form different beliefs about companies' future performance and returns; they may be influenced by some kind of behavioral bias in information processing and profit forecasting, or, due to overconfidence in their beliefs and information, may misunderstand the returns risk. This can lead to faulty pricing, reduced confidence in financial markets, and ultimately, lead to the formation of an inefficient market (Shleifer and Summers, 1990; Khasawneh, 2017). In practice, the boundary between these two groups of investors may be unclear; however, since informed traders play the role of transferring the company's stock price to fundamental values in the market, one can help, through price

decomposition, to make a clear distinction between these two groups of investors (Shleifer, 1961). With the expansion of the amount of explanatory and textual accounting information, the amount of attention and contemplation of investors has also increased to this type of information. Managers using this tool and in the absence of written and binding rules in order to prepare and prepare these types of reports use the types of semantic orientations they consider in order to influence the judgmental and cognitive behaviors of investors. However, little is known about how these groups interpret the textual information in the financial statements and the differences in the stock market response. This issue is expanded by discovering, in past researches, the role of the word and semantic orientation in financial disclosure for both types of investors (Hannemann e al., 2018).

Despite extensive researches outside of Iran on noise trading and its complexity, there is little information about how noise traders interpret board of directors' reports like textual information, and how they react to information, words disclosed, and the tone of these reports compared to rational investors. This might be due to reasons such as the various features of text reports including complexity, volume, readability, feel and tone of information. There is no research that has clearly investigated these issues. Moreover, it is not clear how the elements in textual disclosures and semantic orientations (including emotional, real orientations with positive, negative, and mixed-meaning words) in information disclosure, affect this particular type of investors' decisions, and consequently, their investment returns, and market reaction. Despite the different roles of these two groups of investors in the formation of fundamental values and Noise balances for stock prices and their different trading strategies, their influence in the financial markets, especially the Iranian capital market, cannot be overestimated. In recent years, many people (mainly unprofessional and uninformed) have been engaged in this market and invested their small and large capitals in it, they ignored it and considered it as an unimportant part of the investment process in the financial markets. Iran's capital market is an emerging market with conditions such as poor efficiency, and the government has paid special attention to it in recent years in order to carry out privatization and direct people's small and huge investment resources towards this market. Therefore, to achieve these goals, it is necessary to create transparency, trust and reduce the risk of investing in the market, this is while the presence of a large number of Noise investors in the market causes the formation of faulty pricing in the market and increases the risk of securities transactions due to the difficulty of predicting their activities and decisions. And in this case, the continued presence of these investors in the market in the long term will affect the trust in the financial markets. Therefore, in this study, Kalman filter has been used to break down the stock market price into two components: fundamental and noise residual; and then LASSO Regression has been employed to identify the words that affect the informed and noise traders' decisions. Also, by differencing the many positive and negative words of the board of directors' reports, the overall tone of the reports was identified. Finally, the research result, in addition to filling the research gap in this area, could answer the following questions:

Does informed investors' perception of the words of board reports, compared to that of noise traders, affect the stock returns of companies? And does the tone of the board's reports, from the point of view of informed and noise traders, influence the stock market reaction?

2. Theoretical Foundations and Review of the Literature

Financial statements are tools that can be used to ensure the financial health of businesses (Kothari, 2001). They are known as one of the key ways of corporate governance and, in particular, an example of well-known communication tools. Despite the intermediary role between companies and investors, these reports are prepared as a strategic tool to improve the clarity of communication with stakeholders and provide accurate relevant and necessary information to them; so, in order to improve the quality and observe the principles of corporate governance, they must have the necessary adequacy so that investors can achieve maximum profit and returns by reviewing and analyzing them (Buzby, 1974; Chatterjee, 2007). The issue of obtaining returns, one of the main goals of investors, has been considered by researchers and capital market activists for many years; it was first referred to as classic financial, creating patterns, such as the Capital Asset Pricing

Model (CAPM), the three-factor model of Fama and French (Fama and French, 1993) and the five-factor model of Fama and French (Fama and French, 2013), for measuring returns.

The dominant paradigm in classical financial (modern financial) theories is based on a set of ideal assumptions such as rational behavior assumption and investors' complete utility maximization; however, empirical studies over the past years, due to the classical financial inability to explain the anomalies observed in the capital market, have brought about many attacks and criticisms on modern classical financial theories and their assumptions (Fernandes et al., 2010) because According to experts and thinkers in this field, the main cause of such anomalies in the capital market is the behavioral and psychological issues of investors (Pompian, 2006). Therefore, thinkers in the field of financial studies, who have always sought to recognize and explain the behaviors and causes of financial market events such as the crash of world stock markets, tried to explain the behavior of decision makers in financial markets while establishing a new knowledge of behavioral finance. Also by presenting the limitations of classical financial theories in explaining facts such as human cognitive limitations, they tried to identify human irrational behavior and intellectual and emotional tendencies, along with other economic parameters, as factors affecting the investors' behaviors in financial markets. While affecting the performance of the market and its efficiency, this can have a significant impact on stock returns (Tran and Nguyen, 2013). Based on behavioral financial knowledge, which has added behavioral aspects in the decision-making process to standard financial theories (Olsen, 1998), it is no longer expected that only factors such as quantitative and numerical accounting information and macroeconomic variables affect stock returns; a variety of behavioral, emotional and qualitative variables can also affect stock prices and returns (Setayesh and Shamsoaldinie, 2017). Market participants demand information that can be used to predict the future performance of the company, and thus achieve the desired returns. Providing written information such as the board report and notes to the financial statements, while complementing the financial statements, reveals more detailed and accurate information about the events and future performance of the company. Moreover, because of expressing the management's views and values, it reduces information symmetry between producers and users of information (Clatworthy and Jones, 2003; Balakrishnan et al., 2010). Past researches show that adding written information to quantitative information can increase the information content of firms' financial statements; this should not create an information overload for investors to impair their capacity to process and integrate information (Davis and Sweet, 2012; Simon, 1976). In this regard, for example, Dennis et al. (2019), in their study, examined the effects of disclosure level of quantitative and qualitative accounting reports on the stock pricing efficiency of US stock companies. The results and findings of their research show that the leveling of numerical and textual information in the companies' annual reports, which is done by separating numerical information and text length, significantly leads to increased information productivity and stock pricing of companies. Navid et al. (2020) in a study confirmed the relationship between non-financial information and investors' decision-making. They stressed that participation in the market, quality of customer management, and organizational culture were among the importance and achievements of non-financial information disclosure for investors.

The important point in the field of written and quality accounting reports is that despite the fact that capital market regulators have required companies to submit written reports, they have provided no specific instructions on how to submit and what style of written information to be used. These competent organizations offer no prescriptions in the field of financial and accounting standardization. This factor has caused the way of employing specific words and vocabulary in these reports, contrary to the quantitative information contained in the financial statements, be subject to the managers' wishes and opinions. Words have their own energy and messages that lead to reactions from the audience. Everything we say leave an impact in the world; and in every moment with the words we use, we create positive or negative things (Henry and Leone, 2016).

The increasing number and complexity of accounting textual reports have caused managers, through their control over the situation, to use them, by choosing their specific words and style, both as a strategic and purposeful tool to manage, manipulate, and mislead investors' perceptions – in order to align investors' opinions with their own- (Demers and Vega,

2008), and for persuasive aspects of reports as well as a signal about the organization's future performance. One of the persuasive and signaling methods is the use and repetition of specific words being emotional, positive, negative, etc. in the text, which emphasizes the tone of information disclosure. It is also known as one of the factors affecting the style of expression and disclosure of qualitative information in management reports (Bowen et al., 2005; Henry, 2008). The tone of financial reporting is determined by the ratio of positive and negative terms, and can indicate changes in the level of optimism or pessimism of report disclosure; It can also be a reason for managers' expectations of important financial and accounting statistics over the course of a company's performance. Managers in an opportunistic behavior, by choosing a specific language and vocabulary, can choose a more favorable tone, or by emphasizing certain aspects of their performance and the future perspective of the organization under their command, inform the capital market, as a result Be able to steer the behavior of investor groups in the desired direction and secure the interests of themselves or a particular group (Henry, 2016). Managers' opportunistic behavior is justified by the poor form of market efficiency, according to which it is assumed that investors, especially uninformed and noise ones, are not able to identify and detect biases in managers' reports in the short term. Based on this assumption, to increase their rewards, managers use reports' tone and investors' perceptions to influence returns and stock prices. In contrast, there is a view of complementary and useful information which is based on a semi-strong and strong form of market performance. Here, it is assumed that all market investors, including informed and noise ones, have the ability, despite reasonable expectations about the future returns of companies' stocks, to assess the bias of managers' reports. In such an efficient market, biased reports used to manage and mislead perceptions bring about lower price performance and stock returns. Thus, due to the relationship between agency and the dependence of their rewards on stock performance, managers have no motivation or desire to apply managerial perception (Baginski et al., 2004). In this regard, the results of domestic researches such as that of Kashanei Poor et al. (2020) indicate that specialized vocabulary is a good tool for informing about future performance and coordinating the expectations of managers and investors; and more use of positive specialized vocabulary, along with proper returns on assets improves future performance. Also, the results of the research of Peleh et al. (2020) show that the tone of the board's activity report has a significantly negative effect on the company's profitability and operating cash flows in the following year. In addition, the results of international researches, such as that of Davis et al. (2012) reveal that managers use language and words to try to reflect their expectations of the company's future in the form of reliable information, and expect the market to react to these signs. They also point out that the use of an optimistic expression can be effective in predicting the future performance of the company. Also, the results of the research by Riley et al. (2015) show that the form of information provided by managers, and, according to the studies carried out by Macgregor et al. (2000) and Lux et al. (2015), creating a positive feeling and a strong image in the minds of users of financial reports, influences their decisions and leads them toward investment.

Unstructured textual data in the financial industry has been growing rapidly in recent years (Lewis and Young, 2019). This is where text mining has emerged as an important area of research in the field of finance and has had a significant impact on the financial industry. The purpose of text mining is to extract information and patterns from textual data. This method is derived from data mining techniques, machine learning, computational linguistics, and so on. Previous approaches in this area are manual and traditional in that the reader reads a text and searches for information in it. In this case, the necessary information in the text was extracted efficiently in terms of speed and cost (Herranz et al., 2018; Sukhadia, 2020). To extract important information and signals in accounting text reports, researchers in recent years have preferred digital and automated approaches to previous traditional methods. Since these reports contain a significant amount of hidden information, it may take years if this information is to be extracted manually from this vast body of data. Gupta et al. (2020) in a study examined the application areas of text mining. They concluded that text mining, while integrated with new techniques, plays a key role in supporting banking science and financial markets, which can be used to predict financial trends, analyze emotions, classify and cluster texts, and extract information.

From the first civilizations to the present day, from exchange systems to digital currencies, finance has always played an important role in human life and has been constantly linked to data such as transactions, accounts, prices and reports. Therefore, advances in text extraction have made it possible to efficiently review textual data and predict the efficiency and future performance of companies for all users, especially different groups of investors (Gupta and Dhingra, 2012). Text mining can be used to process natural language, learn something deeply, classify and extract information in the text and, like the present study, to analyze emotions and polarity as one of the most important techniques. This method (emotion analysis) extracts underlying ideas in textual data and can even be referred to as comment mining (Akaichi et al., 2013). Emotion detection focuses on extracting a set of emotion labels; and polarity detection is more of a classification-oriented approach with discrete outputs such as identifying positive and negative words to determine the tone of textual reports (Cambria, 2016). The main vocabulary-based approach (dictionary-based) and the machine learning approach are commonly used in researches to identify emotions and polarity in texts (Xu et al., 2019). In this regard, Lutz et al. (2020), in their research, developed a machine learning method to predict the level of sentence polarity in financial news. They used the method of displaying distributed text and learning multiple instances to transfer information from the document level to the sentence level; this method can thus help investors in making decisions and communicating in order to send the intended messages. Using a text mining approach, Azizei et al. (2022) also studied the effect of Persian news on the stock returns of companies. Using machine learning algorithms, they categorized news into positive and negative. The results and findings of their research show that all broadcast news has a positive and negative semantic connotation. They also found that despite the fact that the value of the stock index follows its historical trend, it is also affected by the broadcast news which is of a fundamental data type.

While the literature on natural language processing and machine learning is increasingly growing in terms of its ability to model, the subtle and complex nature of communication, usage, etc., text analysis (text mining) in finance is just beginning. Some national and international studies that have used text mining methods to investigate the investors' behavior and its impact on financial variables are presented below:

In a study, Bonson et al. (2021), using text mining, examined the potential factors that affect the length and tone of managers' reports to shareholders. The methodological framework of their research is based on the theory of emotion management. The results of their research show that the tone of text reports becomes more positive when the profit, after deducting corporate taxes, decreases, and, when, compared to previous years, the remuneration received by managers increases.

In a study, Mousa et al. (2021) examined the tone of reports in order to predict the financial performance of Bahraini companies. In their research, they used the supervised machine learning method to predict the financial performance of companies. The results of their research show that tone analysis of corporate reports can be used as a complementary or diagnostic approach, rather than an alternative, in decision-making by shareholders, analysts, investors, and auditors.

In their study, Hannemann et al. (2018) examined noise trading behavior as an incompatible approach to news reception in financial markets. They used the Kalman filter to decompose the U.S. stock market reaction to the release of Form 8-K during 2004-2013. Then, using LASSO regression, they extracted the words related to informed and noise traders. The results of their research show that investors have different interpretations of the importance of the words in accounting reports.

Hsieh et al. (2018), in their research, examined the relationship between special risk, stock returns and the feelings and tendencies of noise traders. The results of their research show that when the portfolio of noise traders is associated with high (low) specific risk, they demand only high (low) risk. They also found that at a certain level of risk, noise traders with low emotional inclinations had lower expected returns than noise traders with high emotional inclinations.

Mirzaei et al. (2021) examined the effect of the pessimistic tone of financial reporting on aggressive financial reporting with regard to the role of protection of shareholders' rights in companies listed on the Tehran Stock Exchange during the years 2014-2018. They used Shannon entropy as one of the multi-criteria decision-making methods to measure the protection of shareholders' rights. The results of their research

showed that the pessimistic tone of financial reporting had a significantly negative effect on aggressive financial reporting. It was also found that the protection of shareholders' rights exacerbates the negative impact of the pessimistic tone of financial reporting on aggressive financial reporting.

In their research, Saranj et al. (2019) identified the trading behaviors and risk of noise traders in the Iranian stock market. In their research, they used a quantitative model to measure the risk of noise traders, overreaction, underreaction, and incorrect pricing. The results of their research show that the Iranian stock market has a significant behavioral error, and noise traders are active in the Iranian stock market 100% of the time, which in turn cause market inefficiency. The most common types of inefficiencies in this market are impact percentage, overreaction, incorrect pricing, and underreaction, respectively.

As mentioned earlier, various studies have been conducted in recent years to examine the usefulness of text mining in finance, including research by Gupta et al. (2020), Lutz et al. (2020), Xu et al. (2019), Azizei et al. (2022), and so on. Also on the effect of the tone of accounting textual reports on investors' behavior and stock returns of companies, one can mention the national and international researches such as Mirzaei et al. (2021), Peleh et al. (2020), and Rahnamay Rodposhtie and Mohsenei(2019), Hsieh et al. (2018), Hannemann et al. (2018), Davis et al. (2012), and so on. But as a research vacuum in none of the researches, considering the prevailing market conditions in Iran's capital market and the existence of various behavioral biases on the part of market investors, who are mostly beginners to investigate the effect of different semantic tones and orientations in accounting textual reports, especially board reports on of informed and noise traders' behavior in financial markets. Accordingly, the present study, using the text-mining approach and applying new statistical methods, has investigated the effect of informed and noise traders' perceptions of the tone of board reports on the stock returns of companies in the Iranian stock market.

3. Research Hypotheses

According to the theoretical foundations of the research, the hypotheses were formulated as follows:

Hypothesis 1: Compared to noise traders, informed investors' perception of fact-based words in the board reports has a different effect on companies' stock returns.

Hypothesis 2: Compared to noise traders, informed investors' perception of emotion-laden words in the board reports has a different effect on companies' stock returns.

Hypothesis 3: Compared to noise traders, informed investors' perception of mixed-meaning words in the board reports has a different effect on companies' stock returns.

Hypothesis 4: From the perspective of informed investors, the tone of the board of directors' report influences the stock market reaction.

Hypothesis 5: From the perspective of noise traders, the tone of the board of directors' report influences the stock market reaction.

4. Research Methodology

The present research is applied in terms of purpose, and in terms of nature, it is among the descriptive-correlational ones from content analysis branch. In this study, the statistical population includes all companies listed on the Tehran Stock Exchange and the systematic deletion method has been used to select the statistical sample. For this purpose, the following criteria have been considered and in case a company has met all the criteria, it has been selected as a research sample:

In terms of increasing the comparability, the company's fiscal year leads to the end of February. The company has not changed its fiscal year and type of activity during the period 2012 to 2020. It is not among investment and financial intermediary companies. Their shares have been exchanged at least once in six months during the research period. Their financial information is available. After considering all these criteria, 116 companies have been selected as samples.

In this study, board reports have been used to investigate how informed and noise traders are affected by specific textual elements and semantic orientations of information disclosure. For this purpose, the procedure is summarized in four steps as follows:

The First Step:

In the first step, to measure the informed and noise traders' stock market behavior, for each of the sample companies, using a Kalman filter (Discrete Price Data Analysis), the stock price is broken down into two

fundamental and noise residual components. As a result, two separate time series data are obtained for the fundamental price component and the noise residual. Fundamental component of the price is attributed to the informed investors and noise residual component is attributed to noise traders. To perform the first stage of the research, after collecting the stock price information of the sample companies, this information was entered into Python software and then, using the Numpy and Scikit-learn libraries, the functions and equations of the Kalman filter were implemented. Companies' stock forecast was also taken. Then the obtained outputs were sorted with the help of Excel software and calculations related to fundamental and noise residual components were performed.

The Kalman filter uses a prediction equation to estimate the stock price t+1 using t information. This includes all observations up to time t (t = 0,…, t,) and error covariance estimation. Second, the update equation is used to obtain price-based feedback measured at t+1 (including the noise component) and to correct the t+1 price estimate (previous estimates). The price estimate of t+2 is based on the improved t+1 estimate. Therefore, the Kalman filter effectively takes into account all previously available information to obtain an optimal picture of the future stock price. In addition, it corrects its estimate based on the actual price deviation from the estimated prices. Based on the relevant literature, it is assumed that informed traders act on the basis of fundamental information (no historical price or public news); and this information is reflected in past stock prices (Thaler, 2005). As a result, the information-based trade is explained by the initial estimates used in the Kalman filter to estimate the stock price t+1. In the case of noise traders, their trading behavior is assumed to be based on noisy signals in which they believe, and these signals are considered as relevant information for them. Noise risk is predictable based on neither initial stock price estimates nor subsequent updates. Thus noise residual component is obtained from the difference between Kalman's price estimates for t+1 and the actual stock price at t+1. Accordingly, the Kalman filter is used to separate the stock price data set for each company into two components, as a result of which two time series are obtained for the fundamental component of the stock price and the noise component; the fundamental component of the price is attributed to the informed traders and the noise residual component is attributed to the noise ones. This type of classification is in accordance with the classification of Hahnemann et al. (Hannemann et al., 2018) who used the Kalman filter to divide investors into two groups: institutional investors (informed) and non-professional investors (noise).

The Second Step:

The second step is to identify of informed and noise traders' words in the reports of the board of directors. For this purpose, the board of directors' reports of the sample companies were first extracted from Codal (www.codal.ir) and converted from PDF to Word by uploading the reports on www.eboo.ir. Then, in order to form the word matrix of each report, showing both the words that make up each report and the number each word has been repeated, as well as determining the specific words of each group of informed and noise traders, the regular approach of Proluch et al. (Pröllochs et al., 2018) has been used. In this approach, information stimuli in the text are determined based on the response variable by using Bayesian inference in the form of LASSO regression. This regression is used to select the best subset of a reference set (determining the relevant words for the two groups of informed traders and noise traders). Because the words that make up the matrix, which are used to describe the informed and noise traders' behavior in accepting information from the text of board reports, must have logic and support. In several stages, by employing two libraries of Hazm and NLTK in Python software environment, these words will be refined as follows, and those not having the nature of a meaningful word will be removed:

- First, irrelevant information such as addresses, formulas, etc. are deleted.
- Conjunction are deleted.
- The number of exclusive words is reduced by returning them to the original root of the word.
- The frequency of the roots of each report is stored in the matrix of report words. In this study, following Loughran and McDonald (2011), words with a frequency of less than 5% are removed from the whole text, because words with over 5% frequency are the roots that cause the formation and transmission of the main concept of the text.
- Using the translation of the Loughran and McDonald vocabulary (2011) which could be

provided on Dataheart (www.dataheart.ir), which has already been used in researches by Mohsenei and Rahnamay Rodposhtie (2019) and Por karim et al. (2019), words were divided into three categories: fact-based, emotion-laden, and mixed-meaning ones.

In this research, the root frequency of all words extracted in the report set is used as explanatory variables to interpret the price separated by Kalman filter for the two types of investors. For informed investors, the dependent variable is considered as the fundamental component of stock price, and for noise traders, the residual component (noise) is considered as the dependent variable. The value of the estimated coefficient is a measure of the importance of the word that helps to assess the acceptance of words in financial disclosures. Next, the impact of the news sentiment in the reports by informed and noise traders on the stock returns of companies should be examined. For this purpose, ordinary least squares (OLS) regression is used as described in Model (1):

$$AR_i = \beta_0 + \beta_1 IF_i + \beta_2 IE_i + \beta_3 IMM_i + \beta_4 NF_i + \beta_5 NE_i + \beta_6 NMM_i + \beta_7 CAR_i + \beta_8 Rm + \beta_9 ALPA_i + \beta_{10} MTB_i + \beta_{11} MV_i + \varepsilon_i \quad (1)$$

AR: Daily Cumulative Abnormal Returns of shares from the date of publication of board reports until the closing of the company symbol for the purpose of holding the annual general meeting.

IF: Fact-based words considered by informed investors, which are obtained by multiplying the coefficient achieved in LASSO regression related to informed investors by the frequency of fact-based words in the board report each year.

IE: Emotion-based words considered by informed investors, which are obtained by multiplying the coefficient achieved in LASSO regression related to informed investors by the frequency of emotion-based words in the board report each year.

IMM: Mixed-meaning words considered by informed investors, which are obtained by multiplying the coefficient achieved in LASSO regression related to informed investors by the frequency of words with a compound meaning in the board report each year.

NF: Fact-based words considered by noise traders, which are obtained by multiplying the coefficient achieved in LASSO regression related to noise traders by the frequency of fact-based words in the board of directors report each year.

NE: Emotion-based words considered by noise traders, which are obtained by multiplying the coefficient achieved in LASSO regression related to noise traders by the frequency of emotion-based words in the board report each year.

NMM: Mixed-meaning words considered by noise traders, which are obtained by multiplying the coefficient achieved in LASSO regression related to noise traders by the frequency of mixed-meaning words in the board report each year.

Rm: Capital market returns

ALPA: Market-model *Alpha*$_i$ based on market model

MV: The natural logarithm of a company's stock market value

MTB: The natural logarithm of the market-to-book ratio of a company equity

CAR: Daily Cumulative Abnormal Returns of shares for 15 days prior to the date of publication of the Board of Directors report (due to consideration of internal and confidential transactions and the possibility of information leakage prior to the publication of the report).

To calculate the cumulative abnormal returns, the difference between the actual returns ($R_{i\,t}$) and the expected returns on the stock E ($R_{i\,t}$) is considered as abnormal returns. The market model is used to calculate the expected returns per share:

$$R_{it} = \alpha + \beta R_{mt} + e_{it} \quad (2)$$

$R_{i\,t}$: The actual returns of the share *i* on day *t*, which is calculated by dividing the difference between the actual stock price of each day and the previous day by the stock price of the previous day.

R_{mt} : Market returns on day *t*, which is calculated by dividing the difference between the total index of the Tehran Stock Exchange every day and the previous day by the index of the previous day.

Following the method of Badri and Asilzadeh (2012) and Blue et al. (2015), market model for each share per year based on a period of 250 days from 15 days before the date of publication of the board report to 250 days before it (t- -15, t- -265). After fitting the model and obtaining α and β, the expected returns for the period between the date of publication of the board

of directors' report up to 15 days before it is calculated.

Also, in order to investigate the effect of the tone of the board of directors' reports on the capital market reaction from the perspective of two groups of informed and noise traders, the regression model (3) is used as follows:

$$AR_i = \beta_0 + \beta_1 ITONE_i + \beta_2 NTONE_i + \beta_3 CAR_i + \beta_4 Rm_i + \beta_5 ALPA_i + \beta_6 MTB_i + \beta_7 MV_i + \varepsilon_i \quad (3)$$

ITONE: The difference between the frequency of positive and negative words of informed investors in the text of the board report on the total positive and negative words.

NTONE: The difference between the frequency of positive and negative words of noise traders in the text of the board report on the total positive and negative words.

The rest of the model variables are calculated as in model (1).

5. Research Findings

The results of descriptive statistics of research variables are summarized in Table (1).

As shown in Table (1), the average of the abnormal returns variable is -0.020. The average of the variables of the number of informed investors' fact-based words is 0.332, indicating that on average, informed investors analyze 33.2% of the text of the board of directors' reports about which they care in their decision-making. The average tone of the words of informed investors is 10.7% which is 7.1% for noise traders. This indicates that the frequency of positive and negative words for informed investors was greater than that of noise traders.

Table1: Descriptive statistics result

No	Variable	Symbol	Average	Median	Minimum	Maximum	Standard Deviation
1	Abnormal Returns	AR_i	-0.020	0.066	-121.01	8.872	3.939
2	Informed investors' fact-based words	IF_i	0.332	0.294	0.0428	2.256	0.172
3	Informed investors' emotion-laden words	IE_i	0.029	0.0231	0	0.225	0.027
4	Informed investors' mixed-meaning words	IMM_i	0.035	0.0252	0	0.359	0.040
5	Noise traders' fact-based words	NF_i	0.318	0.285	0.059	2.146	0.285
6	Noise traders' emotion-laden words	NE_i	0.070	0.0526	0	0.594	0.063
7	Noise traders' mixed-meaning words	NMM_i	0.032	0.023	0	0.363	0.039
8	Informed investors's word tone	ITONE_i	0.107	0.094	-0306	0.688	0.131
9	Noise traders's word tone	NTONE_i	0.071	0.068	-0.334	0.844	0.135
10	Cumulative Abnormal Returns	CAR_i	-0.048	-0.059	-0.924	2.312	0.244
11	Capital market returns	Rm_i	0.473	0.238	-0.156	1.780	0.569
12	Market-model *Alpha*$_i$	$ALPA_i$	0.000	0.0004	0.018	-0.024	0.003
13	Value of Company stock market	MV_i	3.719	3.644	2.745	5.467	0.499
14	Market-to-book ratio of a company equity	MTB_i	0.408	0.412	-0.797	2.635	0.412

Source: Research Findings

The first three hypotheses of the study compare the effect of informed and noise traders' perceptions of words (with fact, emotion and compound basis) on stock returns. To test these hypotheses, model (1) fits and its results are listed in Table (2) as follows:

As it can be seen in Table (2), the coefficient and significance level of the variable "Informed investors' fact-based words (IF)" are -287.505 and 0.000, respectively, and less than error level of 5%; also, the coefficient and significance level of the variable "Noise traders' fact-based words (NF)" are 0.497 and 0.858, respectively, and greater than error level of 5%. This indicates that informed investors, concerning their intellectual and theoretical tendencies and conforming to classical theories, pay attention to fact-based words; this is a factor which affects the abnormal returns on corporate stocks. However, noise traders, looking for excitement and other basics for decision making, are inattentive to such words. Therefore, it can be concluded that the first hypothesis of the research about the different effect of informed

investors' perception of fact-based words in board reports, compared to that of the noise traders, on corporate stock returns is not rejected. The coefficient and significance level of the variable "Informed investors' emotion-laden words (IE)" are -1.104 and 0.924, respectively, and greater than error level of 5%; also, the coefficient and significance level of the variable " Noise traders' emotion-based words (NE)" are -7.434 and 0.000, respectively, and less than error level of 5%. This indicates that noise traders, concerning their intellectual and theoretical tendencies and conforming to classical theories, pay attention to emotion-based words; this is a factor which affects the returns on corporate stocks. However, informed investors, looking for facts, news, and information based on logic, are inattentive to such words. Therefore, it can be concluded that the second hypothesis of the research about the different effect of informed investors' perception of emotion-based words in board reports, compared to that of the noise traders, on corporate stock returns is not rejected. Regarding the third hypothesis of the research about the different effect of informed and noise traders' perceptions of mixed-meaning words in board reports on stock returns, the coefficient and significance level of the variable "Informed investors' mixed-meaning words (IMM)" are 5.637 and 0.110, respectively, and significance level of the variable "Noise traders' mixed-meaning words (NMM)" are 5.939 and 0.405, respectively. As it is clear, both significant levels of the variables informed and noise traders' mixed-meaning words are greater than the error level of 5%, based on which it can be concluded that neither the informed nor the noise traders show any reaction to the mixed-meaning words to affect the stock returns. Therefore, the third hypothesis of the research is rejected. Finally, the general conclusion is that the informed and noise traders' perceptions of all semantic orientations contained in the board reports, with the exception of mixed-meaning words, are different from each other and regarded as an influential factor in their achievement of abnormal returns.

The last two hypotheses of the study examine the effect of the tone of the board report on the stock market reaction from the perspective of informed and noise traders. In order to test these hypotheses, model (3) fitting and its results are listed in Table (3) as follows:

Table (2): Results of regression model fitting (1)

Variable	Symbol	Coefficient	Standard Deviation	z-statistic	Significance Level
Informed investors' fact-based words	IF_i	-287.505	8.842	-35.515	0.000
Informed investors' emotion-laden words	IE_i	-1.104	11.626	-0.1	0.924
Informed investors' words with a compound meaning	IMM_i	5.637	2.178	2.59	0.110
Noise traders' fact-based words	NF_i	0.497	2.277	0.18	0.858
Noise traders' emotion-based words	NE_i	-7.434	0.712	-10.43	0.000
Noise traders' mixed-meaning words	NMM_i	5.939	7.127	0.83	0.405
Cumulative Abnormal Returns	CAR_i	3.66	25.812	0.14	0.887
Stock market returns	Rm_i	-13.525	3.236	-4.18	0.000
Market-model *Alpha*$_i$	$ALPA_i$	0.033	1.23	0.026	0.002
Market-to-book ratio	MTB_i	0.143	2.306	0.06	0.036
Equity market value	MV_i	0.082	0.040	2.04	0.041
Intercept elevation	β_0	237.842	12.338	19.28	0.000
Wald statistic 1539.06 (0.000)			Breusch–Pagan 121.71 (0.000)		
Adjusted coefficient of determination 0.642			F-Limer 3.06 (0.000)		
Heteroscedasticity 936.74 (0.000)			Hausman 33.38 (0.000)		
Autocorrelation 45.37 (0.000)					

Table (3): Results of regression model fitting (3)

Variable	Symbol	Coefficient	Standard Deviation	z-statistic	Significance Lev
Informed investors's word tone	ITONE_i	5.762	0.823	7.001	0.000
Noise traders's word tone	NTONE_i	-3.019	1.942	-1.642	0.315
Cumulative Abnormal Returns	CAR_i	-4.515	0.056	-9.13	0.000
Stock market returns	Rm_i	0.661	0.037	17.58	0.002
market-model *Alpha*$_i$	$ALPA_i$	-2.252	0.876	-2.57	0.010
Market-to-book ratio	MTB_i	-9.127	0.670	-13.62	0.000
Market value of equity interest	MV_i	-0.634	0.218	-2.90	0.004
Intercept elevation	β_0	-10.639	1.396	-7.62	0.000
Wald statistic 8395.24 (0.000)			Breusch–Pagan 32.67 (0.000)		
Adjusted coefficient of determination 0.923			F-Limer 4.51 (0.002)		
Heteroscedasticity 1063.05 (0.000)			Hausman 24.11 (0.000)		
Autocorrelation 2397 (0.000)					

According to Table (3), the coefficient and significance level of the variable "Informed Investors' tone (ITONE)" are equal to 5.762 and 0.000, respectively, and less than error level of 5%, indicating that the tone of the board reports is effective for informed investors and leads to a stock returns reaction. However, the fourth hypothesis of the research that the tone of the board's reports affects the market reaction from the perspective of informed investors is not rejected. Also, the coefficient and the level of significance of the variable "Noise traders' tone (NTONE)" are -3.019 and 0.315, respectively, and greater than error level of 5%, indicating that the tone of the words of the board reports is not an effective factor for noise traders in order to achieve stock returns. Thus, the fifth hypothesis of the research that the tone of the board report's words affects the market response from the perspective of noise traders is rejected.

6. Conclusion

As stated, the purpose of this study is to investigate the effect of informed and noise traders' perceptions of the tone of the board reports on the stock returns of companies. The results and findings of the study show that informed and noise traders are able to achieve abnormal returns by using the analysis of board reports. Informed and noise traders can achieve abnormal returns by using fact-based words and emotion-laden words, respectively. In other words, dynamic interactions between informed and noise traders concerning their acceptance of textual elements contained in the board reports changes the prices and consequently the stock returns. According to the research hypotheses, it was confirmed that informed and noise traders' perceptions, only for words and semantic orientations based on facts and emotions, are different from each other, and effective on the stock returns of companies. However, the theoretical foundations of noise trading theory already consider emotions as an explanatory and influential variable on strategies and the basis for noise traders' decisions. In addition, the influence of emotions on human behavior is consistent with the assumption of complete rationality in neoclassical theories, which does not consider rationality and logic as the only motivators of human behavior. The influence of fact-based words on informed investors' perception is also consistent with traditional financial behavioral theories. It is also one of the assumptions of market efficiency theory, which considers investors' rationality and rational behavior as prerequisites for the formation of an efficient market, and informed investors' behavior as an effective factor in transferring companies' stock prices to fundamental values in the market. Regarding mixed-meaning words, informed and noise traders are not able to distinguish such words, and do not seem to pay much attention to them in their decisions. The results and findings of this part of the research are generally in line with the theory of noise traders, and in a way, indicate the behavioral strains (imitation effect) in the Iranian capital market. They are also compatible with the findings of Hannemann et al. (2018) And Ke et al. (2019).

The results model (3) research indicate that since the tone of reports is formed and structured using

positive and negative words or logic- and fact-based words, the tone of board reports is only as an effective factor for informed investors; it does not influence noise traders' behavior and reaction. In other words, according to the agency theory, managers, through managing perception and using an optimistic and pessimistic tone towards the performance and future perspective of the company in their reports, can direct informed investors' behavior only in the desired direction; they cannot use this issue as a tool for noise traders. The results of this part of the research are compatible with the those of Mirzaei et al. (2021), Pele et al. (2020), Mohsenei and Rahnamay Rodposhtie (2019), Bonson et al. (2021) and Davis et al. (2012).

The most important limitation of the present study is the format of board reports, which is generally set in PDF format. Therefore, converting this group of files to the supported file in text analysis software is time consuming and costly. Researchers in the field of finance are also suggested to do the present research with other explanatory accounting reports or with special sections of the board report such as risk management section statement, etc. and compare the results obtained with the results of the present study. It is also recommended that company managers, by reducing the use of emotion-based and mixed-meaning words and managing the writing tone in board reports, prevent noise traders from influencing stock prices and creating fluctuations in the market.

References

1) Akaichi, J., Dhouioui, Z., and Lopez-Huertas Perez, MJ., *Text mining facebook status updates for sentiment classification*. In:2013 17th international conference on system theory, control and computing (ICSTCC), Sinaia, 2013, P.640–645.
2) Azizei, Z., Abdalvand, N., Ghalibaf asl, H., and Rajaei Harandei, S., *Investigating the effect of Persian news on stock returns using text mining techniques*. Iranian Journal of Management Studies., 2022, **4**(14), P.799-816, (in Persian).
3) Badri, A., and Asilzadeh, M., *Hyperreactivity and amplitude of price fluctuations: Evidence from Tehran Stock Exchange*. Accounting and auditing research., 2012, **3**(9), P. 56-73, (in Persian).
4) Balakrishnan, R., Qiu, X. Y., and Srinivasan, P., *On the predictive ability of narrative disclosures in annual reports*. European Journal of Operational Research., 2010, **202** (3), P.789-801.
5) Baginski, S. P., Hassell, J. M. and Kimbrough, M. D., *Why do managers explain their earnings forecasts?* Journal of Accounting Research., 2004, **22**(1), P. 1-29.
6) Bolo, GH., Marfoei, M., and Abolhasan Toroghie, A., T*he relationship between abnormal returns and conservative accounting on the Tehran Stock Exchange*. Auditing knowledge., 2015, **14**(57), P. 27-64, (in Persian).
7) Boudt, K., and Thewissen, J., *Jockeying for position in CEO letters: Impression management and sentiment analytics*. Financial Management., 2019, **48**(1), P. 77-115.
8) Bowen, R. M., Davis, A. K., and Matsumoto, D. A., *Emphasis on pro forma versus GAAP earnings in quarterly press releases: Determinants, SEC intervention, and market reactions*. Accounting Review., 2005, **80**(4), 1011-1038.
9) Bonson, E., Perea, D., and Azevedo, G., *Tone and content analysis in the president's letters to shareholders: Spanish evidence*. Upravlenets – The Manager., 2021, **12**(1), P.78–90.
10) Buzby, S.L., *Selected items of information and their disclosure in annual reports*. Accountin Review.,1974, **49**(3), P.423-435.
11) Cambria , E., *Affective computing and sentiment analysis*. IEEE Intell Syst., 2016, **31**(2), 102–107.
12) Clatworthy, M., and Jones, J. J., *Financial Reporting of Good News and Bad News: Evidence from Accounting Narratives*. Accounting and Business Research., 2003, **33** (3), P. 171-185.
13) Chatterjee, B., *Highlights in annual reports: its perceived usefulness*. International Journal of Commerce and Management.,2007, **17**, P. 166-177.
14) Dennis Y, C., Karel, H., Jiri, N.,and Nattavut, S., *Does the large amount of information in corporate disclosures hinder or enhance price discovery in the capital market?*, Journal of Contemporary Accounting & Economics., 2019, **15**, P. 36-52.
15) Demers, E., and Vega, C., *Soft information in earnings announcements: news or noise*?.INSEAD– Accounting and Control Area and Board of Governors of the Federal Reserve System., 2008, **951**, P.1-58.
16) Davis, A. K., and Tama-Sweet, I., *Managers Use of Language Across Alternative Disclosure*

Outlets: Earnings Press Releases versus MD & A. Contemporary Accounting Research.,2012, **29** (3), P.804-837.

17) Fama, E.F., and French, K.R., A *four-factor model for the size, value, and profitability patterns in stock returns*. SSRN Electronic Journal., 2013,**16**(3), P.1-52.
18) Fama, E.F., and French, K. R., *Common risk factors in the returns on stocks and bonds*. Journal of financial economics.,1993, 33(1), P.3-56.
19) Freedman, M., and satagliano, A. J., *Environmental disclosure by companies involved in initial public offerings*, Accounting, auditing and Accountability Journal., 2002, 15(1), P.94-105.
20) Fisher, R., van Staden, C., and Richards, G., *Tone and the Accounting Narrative*., Hawaii Accounting Research Conference, University of Hawaii, Honolulu, Hawaii, Jan 3-5, 2019.
21) Fernandes, J. L. B., Pena, J. I., and Tabak, B., *Behavior finance and estimation risk in stochastic portfolio optimization*. Applied Financial Economics.,2010, **20**(9), P.719-738.
22) Gupta, A., Dengre, V., and Kheruwala, H, A., *Comprehensive review of text-mining applications in finance*. Financ Innov., 2020, **6**(39), P.1-25.
23) Gupta, A., And Dhingra, B., *Stock market prediction using hidden Markov models. Students Conference on Engineering and Systems*, Allahabad, India, March 16-18,2012.
24) Hannemann, F., Prollochs, N., Alfano, S., and Neumann, D., *Noise Trader Behavior-A Disaggregated Approach to Understanding News Reception in Financial Markets***.** Twenty Sixth European Conference on Information. Portsmouth, Uk. November 28, 2018.
25) Hajek, P., Olej, V., and Myskova, R., *Forecasting corporate financial performance using sentiment in annual reports for Stake holders decision-making. Technological and Economic Development of Economy*., 2014, **20**(4), P.721-738.
26) Hsieh, Tsung-Yu., Lee I, Huai., and Tsai, Ying-Ru., *Idiosyncratic Risk, Stock Returns and Investor Sentiment. Asian Economic and Financial Review*., 2018, **8**(7), P. 853-869.
27) Henry, E., and Leone, J.A., *Measuring Qualitative Information in Capital Market Research: Comparison of Alternative Methodologies to Measure Disclosure Tone*. Journal of accounting Review., 2016, **91**(1), P.153-178.
28) Henry, E., *Are investors influenced by how earnings press releases are written*? *Journal of Business Communication.*, 2008, **45** (4), P. 363-407.
29) Herranz, S., Palomo, J., and Cruz, M., *Building an educational platform using NLP: a case study in teaching finance*. Journal of Universal Computer Science.,2018, **24**(10), P.1403-1423.
30) Kashanei Poor, M., Aghaei, M., and Mohsenei Nameghei, D., *The tone of information disclosure and future performance*. accounting and auditing reviews., 2020, **26**(4), P.570-594, (In Persian).
31) Khasawneh, O, A., *Noise trading in small markets: Evidence from Amman Stock Exchange (ASE*). Research in International Business and Finance., 2017, **42**, P.422–428.
32) Kothari, S., *Capital markets research in accounting.* Journal of Accounting and Economics.,2001, **31**(1), P. 105-231.
33) Ke, Zheng,T., Kelly, B., and Xiu, D., *Predicting Returns with Text Data*. Chicago Booth Research., 2019, **10**(69), P.20-37.
34) Loughran, T., and McDonald, B., *When is a Liability not a Liability? Textual Analysis, Distionaries, and 10-Ks* .Journal of Finance., 2011, **66**(1), P. 35–65.
35) Lux, E., Adam, M. T., Hawlitschek, F., and Pfeiffer, J., *Using Live Biofeedback for Decision Support: Investigating Influences of Emotion Regulation in Financial Decision Making*. Twenty-Third European Conference on Information Systems (ECIS). Münster, Germany, June 17, 2015, P.1-12.
36) Lutz, B., Pröllochs, N., and Neumann, D., *Predicting sentence-level polarity labels of financial news using abnormal stock returns*. Expert Systems with Applications., 2020, 148, P.1-11.
37) Lewis, C., and Young, S., Fad or future? *Automated analysis of financial text and its implications for corporate reporting*. Account Bus Res., 2019, **49**(5), P. 587–615 .
38) MacGregor, D. G., Slovic, P., Dreman, D., And Berry, M., Imagery, *Affect, and Financial Judgment.*The Journal of Psychology and Financial Markets., 2000, **1**(2), P.104-110.

39) Mirzaei, S., Abdolei, M., and Koshkei Jahromei, A., *Investigating the Impact of Pessimistic Financial Reporting on Bold Financial Reporting: Protecting Shareholders' Rights*. Journal of Experimental Studies in Financial Accounting., 2021, **16**(65), P.109-138, (in Persian).
40) Mousa, G.A., Elamir, E.A.H. and Hussainey, K., *Using machine learning methods to predict financial performance: Does disclosure tone matter*. International Journal of Disclosure and Governance., 2021, **4**(1), P. 17-45.
41) Naveed, M., Ali, S., Iqbal, K. and Sohail, M.K., *Role of financial and non-financial information in determining individual investor investment decision: a signaling perspective*, South Asian Journal of Business Studies., 2020, **9**(2), P. 261-278.
42) Olsen, R., *Behavioral Finance and Its Implications for Earning Estimation Risk Assessment and Stock Return*. Financial Analysts Journal., 1998, **52**(4), P.37-44.
43) Peleh, M., Izadinia, N., and Amirie, H., *Investigating the effect of the tone of board activity reports on the future performance of companies based on the two perspectives of signaling and opportunistic behavior of managers*. Two Quarterly Journal of Value and Behavioral Accounting., 2020, **4**(8), P.1-31, (in Persian).
44) Pompian, M.M., *Behavioral Financial and Wealth Management*. John Wiley & Sons, Inc., Hoboken, New Jersey, 2006.
45) Por karim, M., jabbar zadeh kongerloei, S., Bahri sales, j., and Ghalavandi, H., *The effect of earnings management on the tone of financial reporting in the Iranian accounting system*. financial accounting research.,2019, **10**(3), P. 21-44, (in Persian).
46) Pröllochs, N., Feuerriegel, S., and Neumann, D., *Generating Domain-Specific Dictionaries using Bayesian Learning*. Twenty-Third European Conference on Information Systems, Münster, Germany, April 2015.
47) Rahnamay Rodposhtie, F., and Mohsenei, A., *Management, text management and profit management*. Empirical accounting research., 2019, **8**(2), P. 21-52, (in Persian).
48) Riley, T. J., and Luippold, B. L., *Managing Investors Perception Through Strategic Word Choices in Financial Narratives*. Journal of Corporate Accounting & Finance.,2015, **26**(5), P.57–62.
49) Saranj, A., Tehranie, R., Abbasie Mosloo, Kh., and Nadirei, M., *Identify trading behaviors and risk of disruptive traders in the Iranian stock market*. financial management strategy., 2019, **6**(22), P.31-58, (in Persian).
50) Setayesh, M., and Shamsoaldinie, K., *Investigating the relationship between investors' emotional disposition and stock prices of companies listed on the Tehran Stock Exchange*. Accounting Advances.,2017, **8**(1), P.103-125, (in Persian).
51) Shiller, R., Fischer, S., and Friedman, B., *Stock Prices and Social Dynamics*. Brookings Papers on Economic Activity., 1984, **2**(1984), P. 457-510.
52) Shleifer, A., and Summers, L. H., *The Noise Trader Approach to Finance*. Journal of Economic Perspectives, 1990, **4**(2), P. 19–33.
53) Shleifer, A., *Inefficient markets: an introduction to behavioral finance*, (Sinaee and mohammadi, 2016), Ahvaz, University of Chamran.1961.
54) Simon, H., *Rationality as process and as product of thought*. The American Economic Review., 1976, 68(2), P.1–16.
55) Sukhadia, A., Upadhyay, K., Gundeti, M., Shah, S., and Shah, M., *Optimization of smart traffic governance system using artificial intelligence*. Augment Hum Res., 2020, **5**(13), P.1-20.
56) Thaler, R. H., *Advances in Behavioral Finance*. Vol. 2. Princeton, NJ: Princeton University Press, 2005,
57) Tran, T. U. T., and Nguyen, N.Y. T., *The Effect of Investor Sentiment on Stock Returns in Norway and Vietnam*. BI Norwegian Business School – Master Thesis., 2013, P.141- 155.
58) Xu G, Yu Z, Yao H, Li F, Meng Y, Wu X., *Chinese text sentiment analysis based on extended sentiment dictionary*. IEEE Access., 2019, **7**, P.43749–43762.